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NOTICES RESPECTING THE BOTANY OF CERTAIN COUNTRIES VISITED BY THE RUSSIAN VOYAGE OF DISCOVERY UNDER THE COMMAND OF CAPT. KOTZEBUE. BY AD. DE CHAMISSO.

[Translated from the German Edition of the Voyage.]

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THE PHILIPPINE ISLES.

Philippines

THE beautiful woods which clothe the mountains and valleys of these islands with the most luxuriant green, descend also to the very brink of the sea, in groves of *Mangle Trees* (*Rhizophora*), and some other species. The transitory glance which we were enabled to gain of these forests from the public route, and the short distance to which we penetrated their recesses, are insufficient to enable us to describe them properly. *Fig Trees* appeared to be the prevailing kind of wood: some species supporting themselves as strong trees by their singularly interwoven stems and running roots, by which they clasp the rocks and twine over them. Other plants, of very slender stalks, raise themselves to an astonishing height, and while their leafy summits are lost above the leafy roof of the grove, their singular fruit is seen bursting from the lower part of their trunks. Some species retain a frutescent habit, while others climb. We missed in the woods the beautiful forms of the *Acacia Trees*, with their variously pinnated leaves; but numerous other genera of Leguminous Plants here exhibit their peculiar characteristics. The Ferns, (particularly the arborescent ones,) the Climbers, the Orchideæ, which, in Brazil, form almost self-supported gardens in the air, slightly attached to the summits of the trees, are here either entirely wanting, as the *Cacti* and *Bromeliaceæ*, or appear in very diminished numbers. The character which Nature wears is of a much tamer kind. The species of *Palm* are more numerous than in St. Catherine's, many of them are but inconspicuous, and the slender prostrate *Rotang* is indeed the most wonderful of them all. Amongst the Aroidæ is the

Pothos scandens, whose jointed grassy stems and narrow foliage are seen creeping up the trunks of trees.

The graceful *Bamboo Cane* grows abundantly on the banks of brooks, where its thickly clustered stems are often waved by the wind, which causes these hollow reeds to emit a great variety of agreeable sounds. This plant attains its extreme height in the short course of one rainy season; during the following years it becomes woody, and shoots out lateral stems, but without any increase of size. The young sprouts are eaten like asparagus. There are several species described by Loureiro as natives of this place, but not having seen their inflorescence, we could not ascertain this point.

The plains consist alternately of woods and savannahs; but nothing can be poorer than the vegetation of the latter; consisting chiefly of two species of grass, which grow about eight feet high, and probably ripen their seeds in autumn. There are a very few dwarf plants, mostly of the leguminous tribes, and these grow under the shade of an arborescent species of *Bauhinia* which appears singly at considerable intervals. These savannahs are often set on fire, both to prepare them for cultivation, and that they may produce younger vegetation for the cattle.

A particular species of *Musa* (*Banana* or *Pisang*), of which the fruit is not esculent, is cultivated for the sake of its fibrous stem, and considered preferable to many others. The filaments (being the long vessels of its peduncle) extend the whole length of the stem, which is generally about eight feet; and they are of various degrees of fineness, according to their outer or inner situation. Thus the same plant affords the fibres of which are made the excellent anchor cables, almost exclusively employed by the Spanish vessels here, and that more delicate flax which is used in the manufacture of the fine striped cloths of which the cleanly people of these islands make very elegant shirts.

Another *Palm* grows here, (*Palma de Cabello negro*;) it yields a strong, black, coarse fibre, much esteemed for ropes and cables, and far preferable to what is obtained from the *Rotang*, which, though employed by the Chinese and many

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of the islanders of the Pacific Ocean, is considered as of little value, and not to be depended upon. This *Palm Tree*, on the contrary, is much cultivated, and, with the *Bamboo* and *Rotang*, constitutes one of the most useful plants of this part of the world.

THE MARIANNE ISLANDS.—GUAJA.

This island is well wooded, its Flora seems rich, and the vegetation luxuriant. Forests clothe its steep descents to the sea shore, and in several sheltered spots the *Mangle Trees* (*Rhizophora*) actually dip their pendent boughs in the flood. Nothing can exceed the delicious perfume which was wafted to us across the waters, while we were sailing about in search of an anchorage. The *Orange Trees* grow wild, as do many other kinds of fruit trees, memorials of a once flourishing cultivation. Several species of plants formerly introduced here, now vie in luxuriance with the indigenous inhabitants of the soil; such as the prickly *Limonia trifoliata*, and the *Indigo Shrub* (*Indigofera tinctoria*), the use of which even is now unknown. The *Breadfruit*, *Cocoa*, and *Pisang* (*Banana*), are most abundant; the *Mango* (*Mangifera indica*) grows well where it was planted, but does not become naturalized. Of the various species of plants which prevail on the continent of Asia and the islands of the Pacific Ocean, we only found the *Barringtonia speciosa* and *Casuarina equisetifolia*. We wholly missed the forms of plants so characteristic to New Holland, the *Proteas*, *Epacrideæ*, *Myrtles*, and simple-leaved *Acacias*. On the other hand, we found most of those that grow at Radack, many of which again were wanting at Luçon; such as the *Tacca pinnatifida*, which, though a native of Cochin China and cultivated, does not appear at Manilla. Two species of *Pandanus* and many kinds of *Fig* are natives of Guaja.

RADACK, RALICK, REPITH-URUR, BOGHA.

The Flora of these islands is very scanty. On the range of Radack we found but fifty-nine species, including those that are cultivated. Twenty-three of them, five being in

cultivation, we had before seen at O-Waihi; and twelve, including the *Cocoa Tree*, were collected at the Island Romanzoff, where we gathered in all but nineteen species. About twenty, again, we found at Guaja. Neither the *Orange* nor *Cabbage Palm*, both of which have, on doubtful testimony, been stated to grow on the Mulgrave Islands, could we find; nor learn any thing with certainty about them.

We do not however believe that the vegetation of Radack is confined to the above-mentioned number of plants; but rather think that both on this island itself, and the groupe of which it forms a part, and which we had not the opportunity of thoroughly investigating, many individuals may have escaped our search. The southern islands, in particular, which we did not visit, (Arno, Meduro, and Millé,) which have an older vegetation and much richer soil, are likely to produce many species which are wanting to the more northern and barren groupe. Vegetation appears on this chain of islands to have commenced in the south, and followed the course of the inhabitants, in a northerly direction.

The most useful *Palm* found here is the common *Pandanus* or *Screw Pine* of the South Seas, (*Wob.*) It grows wild in the most arid sands, where vegetation first commences, and enriches the soil by its numerous decaying leaves, which it throws off in great numbers. In the moist lowlands of the richer islands, it thrives equally well, and numerous varieties of it are cultivated with care, being propagated by layers, and their fruit much improved by culture. All of these, if increased by seed, reassume the original characteristics of the parent species, the *Eruan*. More than twenty varieties are reckoned; the difference between them existing in the various outward form of their fruit, or its compound nature, or the number of separate kernels which it contains. The male tree is always called *Digar*, the wild female, *Eruan*; each variety having a different name. That part of the fruit which is used for food by the people of Radack, is by the natives of the Sandwich, Marquesas, and Friendly Islands, employed as an odoriferous and golden-shining garland. We may here remark that the genus *Pandanus* particularly

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requires strict examination, as the characters that most botanists have used to discriminate the various species are of no weight whatever. Loureiro, in his *Flora Cochinch.* expressly states that the fruit of *P. odoratissimus* is not esculent; but it constitutes the chief food of the people of Radack. Each of the seeds of which this compound fruit is composed, contains at the base where it is affixed, an aromatic juice. To obtain this, the fruit is first knocked to pieces with a stone, and then being chewed, the fibres are rejected from the mouth. The fruit is also baked in pits, as in the South Seas; not so much for the sake of eating it in this state, but that the *Mogan* may be prepared from it. This is an aromatic dry confection, which is carefully stored up for voyages. All the members of one or more families are employed together in making the *Mogan*. When the fruit has been baked, its concreted juice is carefully scraped out with the edge of a mussel-shell, then spread on some leaves over a gridiron and dried in the sun, or by a gentle fire. The thin cake thus formed, is closely rolled up, and the roll neatly wrapped and tied in the leaves of the tree. The almond of this fruit is pleasant, but being difficult to get out, it is often neglected. From the foliage of the *Pandanus*, the women of these islands prepare all sorts of mats, some to serve for their aprons, others with ornamented borders, and the coarser and thicker kinds which form the sails of their vessels, and are employed by them for bedding.

Next to the *Pandanus*, the *Cocoa Tree* (*Ni*) holds the second rank. Not only is its nut valuable as affording good oil, and forming a variety of utensils for domestic purposes, in which they carry their food and drink, but the fibres that surround the stem are employed for making cordage. The *Pandanus* gives food, and the *Cocoa Tree* the materials for navigation to these people. The manufacture of ropes is the labour of the men, and the first of the natives may be seen thus engaged. The fibres of the bark are cleansed and separated by maceration in pits of fresh water, and then spun. The wood of the old trees is reduced to powder, and formed into a paste with the juice of the unripe fruit: thus prepared and

dressed in one of the shells, it is baked over the fire. The cocoa-nut shells are the only vessels which these people possess for carrying water; they are placed in longish wicker baskets made on purpose, several being arranged side by side, with the *eyes* of the nut upwards. The *Cocoa Tree* is planted and propagated every where, both on the inhabited and uninhabited islands; but in most of the young plantations, the trees only bear fruit in the inhabited islands; where their lofty crowns are seen waving high in the air. The *Cocoa Tree* bears but very small nuts at Radack.

The *Breadfruit Tree* (*Ma*) is not very common at Radack, and is only planted in the wet and closely inhabited islands. Old trees are however met with even on some of the poorer ones. Its wood, as well as its fruit, is valuable; from it are made the keels of their boats; the other planks being chiefly formed of buoyant wood, joined together with cords of the cocoa bark, and the interstices caulked with leaves of the *Pandanus*. The *Breadfruit Tree* likewise yields a gum which is useful for different purposes. There are many varieties of this tree, as is generally the case with all cultivated plants; those produced here do not vary much from the parent species; their fruit is small, and the seeds in it frequently perfect.

An useful fibre is procured from the rind of three different species of plants, which grow wild, the principal being from a shrub of the *Nettle* family (*Boemeria*?), called here the *Aromä*, and only found on the best moist soils. The thread which the *Aromä* affords is white, extremely fine and strong. The *Atahät* (*Triumfetta procumbens*, *Forst.*) is a creeping plant of the *Tiliaceous* kind; it is common, and, with the *Cassythä*, covers the driest sands. From its brown bark, the material of the men's aprons is chiefly procured; they consist of stripes of bark hanging loose, and sewed to a girdle of matting. The ornamental borders of the finer mats are also made of it. The fine white fibrous bark of the *Hibiscus populneus* (*Lo*) which we saw at Radack, but only on the groupe Aur, is used in the same way. Ropes are manufactured of this bark at the Sandwich Islands, and elsewhere.

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A nourishing flour is obtained from the tuberous roots of *Tacca pinnatifida*, which grows here plentifully; but it does not appear to be in general use.

The different species of *Arum*, *A. esculentum*, *macrorhizon*, and *sagittifolium*, as well as the *Banana* and the *Rhizophora gymnorhiza*, are severally cultivated, here and there, on the various islands. The culture of the *Banana* seemed to commence at Kaban; but it was only at Aur that we saw it bearing fruit. The species of *Arum* nowhere meet here with the deep boggy soil that best suits them; indeed there is nothing growing spontaneously on these islands which forms an essential part of the food of the population.

Besides these plants, there are commonly cultivated about their dwellings two of the rarest wild species, which are very ornamental; a *Sida* and a *Crinum*, whose sweet-scented flowers, with those of *Guettarda speciosa*, *Volkameria inermis*, and at Aur the *Ixora coccinea* (?) are worn in pretty garlands around the long coiled hair and in the ears of the poor natives of Radack, who are distinguished by their general taste for elegant decorations and great fondness for perfumes.

The sea throws upon the reefs of Radack great trunks of *Fig trees* from more northerly countries, with the *Palms* and *Bamboos* of the torrid zone. It thus supplies the wood necessary for navigation, while the iron found in the wrecks of European vessels affords another requisite article. The only instruments which they possess for working up the drift-wood are formed of the valuable metal thus obtained. In confirmation of the fact that much iron is thus procured, we saw a large piece of timber lying on the strand, with the iron nails still remaining, sticking in it, at a sheltered spot in Oldia, one of this group of islands. From the same source the natives obtain another treasure, a useful kind of very hard stone, which is found in the roots and hollows of trees cast up by the sea. Iron and stone belong to the chieftains, to whom they are compelled to deliver these articles for a trifling remuneration, under pain of punishment.

The sea also wafts to these islands the fruits and seeds of many trees, of which the greater part are not indigenous.

Most of them appear still to be in a state for vegetation, and we have frequently, with many good wishes, committed these presents to the bosom of the earth. Among them we found the fruit of that *Pandanus* which only grows in the western countries, and seeds of *Barbingtonia speciosa*, *Aleurites triloba*, and other trees belonging to the general Flora of Polynesia, and which we have met with near the Marianne Islands. The greater number of these seeds belong to the arborescent or climbing Leguminous Plants, which grow plentifully everywhere between the tropics. Those of *Guilandina Bonplandii* are very common among them; but we only saw the plant itself once, on one of the Leeward Islands. We observed that such seeds as are deposited by the waves on the reefs situated in the sheltered spots of the island, seem to vegetate more freely, being more protected from the blasts, and finding a better soil than those that are thrown up on other parts of the island. Among the rejectamenta of the ocean are frequently seen round Pumice-stones, with masses of closely tangled *Cassitha*, similar to what the *Zostera marina* forms on some of our coasts, and which are called in France, on the shores of the Mediterranean, *Plotte de mer*.

Caroline's

THE CAROLINE ISLANDS.

A variety of useful *Palms* from the Philippines, among them *Palma brava*, *Palma de Cabello negro*, &c., which, as well as the plants of the Pelew Islands, are cultivated here, give an idea of the richness of the Flora. Cap enjoys, with Pelew, the privilege of an elevated situation; among its productions we find the *Areca Palm* (*Areca Catechu*), the *Bamboo*, and three kinds of trees which grow on the mountains, from whose timber boats are built, for which purpose the *Breadfruit tree* alone is employed on the lower islands. The *Aleurites triloba* grows here also, and the *Clove* (*Caryophyllus aromaticus*); the latter is not, however, esteemed, for the fruit is useless and bitter, and its whole appearance mean and ugly. The *Orange*, the *Sugar-Cane*, and lastly the *Curcuma*, all of which are produced at Ulea and the lower islands,

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thrive here in the greatest abundance. Kadu recognised on the Sandwich Islands, and under the reefs of Radack, in many species of seeds that were drifted there, the natives partly of Cap, and partly of the lower islands of the Caroline groupe. Of all the southern islands, Feis has the best soil and richest vegetation. The *Bamboo*, whose utility caused it to be introduced there from Cap, succeeds very well; and from the same source the other islands procure many of their desiderata.

Many species not found at Radack, and boasting a more luxuriant growth, are seen at Ulea and all the southern islands of the Pacific. Luis de Torres has even carried plants from Ulea to Guaja, which were strangers to the Flora of this high district.

All these islands are rich in *Breadfruit trees*, *Bananas*, and esculent roots. The natives of the low grounds subsist chiefly on the *Breadfruit*, of which several large-fruited varieties are cultivated under different appellations; while on the higher lands, *Roots* constitute the chief support of the people: particularly those of the *sweet Potatoe* (*Camotes**) which, with seeds of other useful plants, were brought by Cayal and three of his brothers, from the Bisayas or Philippine Isles, where they are indigenous, and whence they have spread to other districts. According to Kadu, they do not succeed at Ulea. In the Pelew Islands, many varieties of *Arum* are cultivated, some of them attaining a great size; but they are almost confined to elevated situations, and thrive best at Feis.

The *Pandanus* grows on all the Carolines; but its fruit is neither eaten nor used for ornaments, and we saw none of the improved varieties. The agriculture of Cap is quite unparalleled; floating gardens of *Arum* being ingeniously constructed on the waters, with wood and drift *Bamboo*.

* The Spaniards call the sweet roots *Camotes*, having borrowed the name from the Philippine Islands. The *Camote* of the Tagales and Bisayas was cultivated here before the conquest.

The *Pisang* (*Banana*) is here cultivated, but more for the sake of its fibres than fruit. Of the former, the women weave or plait elegant mat-like stuffs, or rather, perhaps, stuff-like mats. A piece of this fabric, when finished, is generally the shape of a Turkey shawl, one ell broad, and several ells long, with black threads interwoven at each end, forming ornamental patterns, and the ends of these threads hanging loose as a fringe. These cloths are sometimes dyed with *Turmeric*, (*Curcuma*.)

Another plant of the *Mallow* tribe yields a stringy bark, which, in some of the islands, is similarly employed in weaving.

The *Paper-Mulberry tree*, and the bark cloths of O-Waihi were unknown to Kadu. Much of the trade of Cap consists in a powder made from the rasped roots of the *Curcuma*: it is a general fashion, from Tuch in the east to Pelli in the west, to dye the skin with this powder; but this practice does not prevail in the groupe of islands situated to the south-west of the Pelews, nor at the Mariannes. The custom of preparing a sweet syrup from the sap of the *Cocoa Tree* is only known at Pelew; for drinking *cava* and using salt are alike unpractised in these islands.

THE ISLE ROMANZOFF.

The Flora here is poor in the extreme; we counted only nineteen species of perfect plants, (one *Fern*, three *Monocotyledones*, and fifteen *Dicotyledones*) and we do not think that many escaped our observation. The *Cryptogamous* plants, with which, in higher latitudes, vegetation commences, appear to be wanting here. The *Lichens* are only seen on the older trunks of trees, like a covering of dust; and the black powder which sprinkles the stones, seems not of a vegetable nature. Even a *Moss* and some *Fungi* which we found at Radack, did not appear at Romanzoff. The plants we saw were a *Polypodium*, the *Cocoa tree*, the *Screw Pine* (*Pandanus*), a *Grass*, *Scævola Königii*, *Tournefortia argentea*, *Lythrum Pemphis*, *Guetarda speciosa*, a *Cassytha*, an *Euphorbia*, a *Boerhaavia*, and an herbaceous kind of *Nettle*; all these being plants which we had found at Radack; and those which are wanting at the latter

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island, are two shrubby *Rubiaceous* species, and another kind of shrub; *Heliotropium prostratum*, *Portulacca oleracea*, a *Lepidium* (*acre*?) and a *Buchnera*?

A thin vegetation, through which the ground is everywhere seen, prevails here, consisting of a few shrubs with entire-margined, simple, mostly succulent leaves and colourless flowers; these form a kind of thin brushwood, above which the *Cocoa Tree* raises itself, while the *Pandanus* is conspicuous by its singular form, entwined with the leafless, reddish stems of the *Cassytha*.

THE SANDWICH ISLES.—THE JOHNSTONE ISLANDS.

The collections of plants which Archibald Menzies, the learned companion of Vancouver, formed in his different expeditions to the heights of O-Waihi and Mauwi, are still, with many other treasures, enshrined in the herbarium of Sir Joseph Banks; and although this venerable Nestor of naturalists throws open his *Gazophylacium* to all the learned with the most unconstrained liberality, yet no one has at present undertaken to make us acquainted with the alpine Flora of O-Waihi.

The vegetation of O-Waihi has nothing in common with the adjoining continent, the coast of California. The leafless form of the *Acacias*, the genera *Metrosideros*, *Pandanus*, *Santalum*, *Aleurites*, *Dracæna*, *Anomum*, *Curcuma*, and *Tacca*, impress on it the character of their natural affinities. The families of the *Rubiaceæ*, *Apocynææ*, and *Urticææ* prevail; of the latter many wild species are used for making various kinds of bark-cloth*; and some arborescent milky *Lobeliaceæ* are also found. The immediate margin of the island produces only a few kinds of grass and herbs. In the interior, the Flora is rich; but it will bear no comparison with the luxuriant variety of Brazilian nature. Only low

* The *Paper-Mulberry* (*Broussonetia papyrifera*) is cultivated in the Sandwich Islands, as in most of those of the South Seas, for the manufacture of cloth. But it is a mistake to suppose that it is the only plant used for that purpose.

trees are found in the vallies; among them the *Aleurites triloba*, whose whitish foliage forms a singular kind of brush around the base and the declivities of the mountains. Here and there, in the deep fissures of rocks, may be seen astonishing groves of *Bananas*, which, growing thickly, stem close-pressed to stem, cause a gloomy darkness to prevail beneath their wide spread leaves. These plants, if grown near the beach, scarcely attain a height of five feet, but in such situations as the above, they often treble that stature. The *Acacias*, from whose hollowed trunks the large canoes of the Sandwich Islands are made, attain on these mountains only to the size necessary for that purpose, and there alone is the Sandal-wood found, which is so much prized in China; while the ruler of these countries knows its value so well, that he makes it the means of inflicting poverty upon his oppressed people, who are obliged to collect it, and neglect the necessary art of cultivating the ground.

The *Tarra-root* (*Arum esculentum*), after being boiled, is stamped into a tough pulp, and constitutes the principal food of the people. O-Wahu is that one of the Sandwich Islands which produces the greatest number of esculent plants, and part of the *Tarra* used at O-Vaihi is thence derived. The culture of the vallies which lie behind Hanaruru is really astonishing. Artificial irrigations enable the natives to form, even upon the hills, large aquatic plantations of *Tarra*, which are at the same time employed as fish-ponds, while all kinds of useful plants grow on the banks which form their borders. Many introduced plants are now cultivated by some of the original inhabitants; but those of the people who retain their old manners make little use of them. Among these, the *Tobacco* may be considered as the principal; and it is indeed a vegetable which the natives of all parts of the globe have shown a readiness to employ. *Water-Melons*, *Melons*, and other kinds of fruit have been gladly adopted here. Besides the destructive *cava*, a fermented liquor is prepared from the *Tea-Root* (*Dracena terminalis*); but the *Sugar-Cane* has never yet been employed for that purpose.

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THE ALEUTIAN ISLANDS AND BEHRING'S STRAITS.

The cove of Awatscha, lying between the same degrees of latitude as Berlin and Hamburg, and the haven of St. Peter and St. Paul, in the interior, seem to be but little exposed to the influence of sea winds. The arborescent *Birch* grows here; but stunted and very different from the slender elegant tree which is so much admired in the north of Europe, and particularly at Petersburg. *Pinus Cembra*, which on our Alps grows at greater heights than *P. Abies*, and forms the boundary of the trees, *Sorbus Aucuparia*, *Alnus incana*, and some *Willows* are seen, but they remain quite shrubby. Timber may however be raised in the interior of the peninsula, where the climate is milder than on the east coast; and the seeds of the *Pinus Cembra*, which are eaten at the tables of Russians, come from Siberia *via* Ocholtzk.

Grasses and herbaceous plants thrive luxuriantly, the soil being rich and the sky mild. There are but few species of vegetables, and these seem about equally distributed. In shady spots grow *Spiræa kamtschatica*, *Allium ursinum*, *Mai-anthemum canadense*, *Uvularia amplexifolia*, *Trillium obovatum*, &c. In the pastures are a *Veratrum*, *Lilium kamtschaticum*, *Iris sibirica*, &c. On the hills, which are rocky, abound some species of *Caprifolium*, *Spiræa*, *Rosa*, the *Atragene alpina*, and other mountain plants, as *Rhododendron kamtschaticum*, *Empetrum nigrum*, *Trientalis europæa*, *Linnæa borealis*, *Cornus suecica*, *Saxifragæ*, &c. Some kinds of *Fern*, from the number of individual plants, form a considerable part of the vegetation. *Urtica dioica*, which was probably introduced, now seems to have established itself as a prevailing inhabitant of the soil.

The peninsula of Alaska, and the adjoining island, called Unimak, which is only separated from the continent by a narrow strait, seem to have the same character of vegetation as the main land, for trees are produced there, while Unalaschka and the other islands of this range are quite bare of them. A few miserable *Firs*, originally brought from

Sitka and planted at Unalashka, may still be seen, most of them decayed, and the others scarcely seem likely to live; but the plantation is yet young, and it is well known how ill trees of this kind bear a removal.

As we have been thrice at Unalashka, both in spring and autumn, and have investigated its vegetable productions with particular care, we shall make this island serve as a point of comparison whereby to describe the character of those other northerly situated countries at which we touched.

Unalashka

At Unalashka, under the same latitude as Lubeck, the *Willows* scarcely grow higher than the luxuriant grass and herbs of the moist grounds. As soon as we ascend the inferior hills, a completely alpine vegetation appears; even on the least elevated regions of the mountains are some *Vaccinia*, resembling *V. Myrtillus*, which scarcely rise above the ground. Besides the brilliant verdure due to a moist atmosphere, which here adorns the grass, and enlivens even the summits of the rocks, the lustre of the fresh unsullied snow, and of some social plants, bestow on this dreary country a variety and beauty of hues which are quite delightful. *Lupinus nothensis*, *Mimulus luteus* (Pursh), *guttatus* (Willd. En. Suppl.), *Epilobium angustifolium* and *latifolium*, *Rhododendron kamtschaticum*, &c. are among the most conspicuous. The fresh green of the turf even reminded us of the valley of Ursera.

The vegetation here appears to have nothing farther in common with that of St. Peter and St. Paul, than as respects its alpine Flora and the coast plants of these northern shores. Besides such species as are likewise found more north, we have only the *Lilium kamtschaticum*, (except indeed the variety seen at Unalashka prove a distinct species,) and the *Urtica amplexifolia* common to both places; while, on the contrary, we found more Kamtschatkan species of plants on the American coast, north of Behring's Straits, which we missed at Unalashka. It is the Flora of the North-West Coast of America which descends to the base of the hills of this island, where it unites with the Arctic Flora. As examples of this, we may cite *Rubus spectabilis*, *Lupinus nothensis*,

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(which is also found, though dwarfish, on the hills,) *Epilobium luteum*, and *Mimulus guttatus* (Willd.*), *Claytonia unalaschensis* (Fisch.), and *sibirica* (*alsinoides*? Pursh), may be also reckoned here. *Sanguisorba canadensis*, *Lithospermum angustifolium*, &c. belong to the common Flora of America.

Many species of *Grasses* thrive in the low lands, with some *Umbellatae*, such as *Angelica*, *Heracleum*, &c. A dozen *Carices*, scarcely forming a larger proportion of the vegetation than in the north of Germany; some *Scirpi* and *Eriophora* accompany them, with a few *Junci*, in the proportion of about one to two. The *Orchideæ* constitute a groupe of some importance, both because of the number of species and the beauty of the individuals; they prevail both in the vallies and on the hills; and we counted eleven kinds: among them a beautiful *Cypripedium*. Higher north, we did not observe a single plant of this family. Of the *Ferns* we found about eight species; nearer to the Pole there is but one *Filix*, and even of this we only saw a solitary specimen. At Unalaschka there are some *Lycopodia*; in the more arctic regions but one. We found in the lakes many water-plants; *Potamogeton*, *Sparganium*, *Ranunculus aquatilis*, &c.; in the higher latitudes we observed only the two species of *Hippuris*, and the common *Callitriche*.

Two other *Ranuncula*, the *Prunella vulgaris*, a species of *Rhinanthus*, of *Cineraria*, *Achillæa*, *Plantago*, and *Geum*, some *Rubiaceæ*, a *Claytonia*, the *Menyanthes trifoliata*, a *Triglochin*, &c. belong, with the other above-mentioned plants, to the Flora of the vallies of Unalaschka. We saw also a *Bartsia*, apparently different from the *Bartsia pallida* of more northerly situations. To a beautiful plant, which constitutes a new and distinct genus, we gave the appellation of *Romanzoffia unalaschensis*, in commemoration of the noble promoter of all science in Russia. The genera *Rumex*, *Polygonum*, *Aconitum*, *Thalictrum*, some *Alsineæ*, the *Iris sibirica*, *Geranium pratense*, *Comarum pratense*, and *Montia fontana* are distributed all over these arctic regions.

* The seed of this species, which was raised in the Botanic Garden of Berlin, is said to be brought from Baikal.

The *Empetrum nigrum*, with *Helleborus trifolius* (Linn.), the latter being an American plant which we did not see again more to the north, are found upon most of the hills, and indicate the alpine nature of the scenery. There are also some species of *Vaccinium*, and the common *Oxycoccus*, *Arbutus alpinus* and *Uva-ursi*, with a white-flowered *Menziesia*, (probably a variety of *Erica cærulea*,) *Rhododendron kamschaticum*, *Azalea procumbens*, *Andromeda lycopodioides*, (which, nearer to the Pole, yields to *A. tetragona*,) the alpine Willows, *Silene acaulis*, *Sibbaldia procumbens*, *Cornus suecica*, *Trientalis europæa*, *Linnaea borealis*, *Ornithogalum striatum*,* *Anthericum calyculatum* (Linn., var. *borealis*), *Konigia islandica*, a *Gymnandra*, apparently different from that one found higher north, ten *Saxifrages*, three species of *Pedicularis*, some *Potentillæ*, two *Gea*, two *Anemones*, three kinds of *Primula*, a *Popaver*, a *Drosera*, a *Pinguicula*, two *Pyrolæ*, a *Viola*, a *Parnassia*, a *Rubus*, and an *Armeria*. There was but one alpine *Ranunculus*, and three *Gentianæ*; of these genera there are more individuals in higher latitudes. Of the class *Syngenesia*, we found *Aster*, *Hieracium*, *Gnaphalium*, *Leontodon*, and *Artemisia*; this class prevails greatly as we approach the Pole, the genus *Artemisia* in particular, exhibiting many individuals. On the other hand, *Unalaschka* produces some alpine species of the genera *Campanula* and *Veronica*, which are entirely wanting in the north. There are some individuals of the order *Crucifère*, scattered partly in the hills and partly in the vallies. We did not find at *Unalaschka* *Alnus incana*, *Betula nana*, *Ledum palustre*, *Dryas octopetala*, *Diapensia lapponica*, *Rhodiola rosea*, the genera *Spizæa*, *Astragalus*, *Allium*, *Myosotis*, *Corydalis*, *Valeriana*, *Aretia*, *Androsace*, *Dodecatheon*, *Delphinium*, or *Orobanchæ*; all of which are natives of more northern latitudes.

The maritime Flora, which is unaltered in the arctic regions, consists particularly of *Elymus mollis*, (Herb. Görenk. Trinius in Sprengel's En. 2. p. 72.) *Arenaria peptoides*, *Pisum*

* There are two varieties of this plant, which may perhaps be distinct species.

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maritimum, with various appearances of *Pulmonaria maritima* (Willd.), being probably different species, the *P. parviflora* (Pursh), *Cochlearia officinalis*, and *Arnica maritima*, which, though here very luxuriant and branched, in more northern situations is only one-flowered. To this list we may add *Potentilla anserina*. The sea along the coast and in the creeks is rich in *Algæ*; while the *Fucus esculentus* (the Sea Kale of the Russian inhabitants) is particularly observable among many gigantic species of the genus.

At Unalashka, the *Mosses* and *Lichens* begin to assume that predominant station which they hold in all the very cold districts.

We took but a cursory view of the islands St. George and St. Paul, situated in nearly the same latitude as Riga. It is extraordinary how much more frigid does Nature here show herself than at Unalashka. No sheltered vallies, no protected spots favour the vegetation of the plants of milder climes; but a perfectly alpine growth prevails, both on the hills and the beach. The high summits of the desolate rocks are covered with pale and black *Lichens*, while those places which are irrigated with melted snow afford only *Sphagnum*, a few other *Mosses*, and some *Carices*. There are no springs in the soil. The various arctic plants choose, according to their nature, the rocky or the moory spots; and none elevate themselves above the ground, to which they seem closely pressed. A *Lupine* on the island St. George, and an *Achillea* at St. Paul, remind the observer of the productions of Unalashka; but there are also several species which are not even seen in the highest parts of the latter island, such as *Ranunculus Pallasii* and *Gmelini*, an *Androsace*, and a *Claytonia*. We found only one plant peculiar to these islands, a *Cochlearia*? which is plentiful and characteristic.

The alpine or arctic Flora which here (at St. Lawrence) adorns the foot of the mountains, does not appear to entwine their brows; for when these are entirely free from snow, and the water produced by the melted snow irrigates some brilliant plants, the dry ridges and declivities of the masses of fallen rocks are only scantily attired with gray and black *Lichens*.

St George

St Paul 185

? *Cochlearia*
Hkr, F.B. 187

Cochlearia
spatululata
(*Draba grandis*)
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Hooker had specimens from Chamisso, who considered this to be "the only plant peculiar to the islands St. George & Paul."

The mountains of these dreary climes being unprotected by any covering of vegetation, soon decompose. The frost bursts the rocks, every summer's gentle warmth causing fresh ruins, and so destruction hastens towards its completion. Wherever the abundance of *Sphagnum* has not produced a boggy turf in the deeply watered places, the ground presents only heaps of broken rocks.

The aspect of Nature at the Cove of St. Lawrence is most wintry; the scanty herbage barely covering the black soil, while the dwarfish *Willows* do not reach to one's knee. The *Andromeda polifolia* which we found there, did not exceed two or three inches in height, and was one-flowered. Among the vegetables of this Cove, we found a *Delphinium*, a *Dodecatheon*, an *Aretia*, and we saw there also the greatest number of species belonging to those truly arctic genera, *Gentiana*, *Saxifraga*, *Astragalus*, *Artemisia*, *Draba*, *Ranunculus*, and *Claytonia*, many of these being undescribed.

The Island of St. Lawrence, situated two degrees more to the south, does not differ in vegetation from the Cove of the same name. The *Andromeda tetragona*, *Dryas octopetala*, *Diapensia lapponica*, with some alpine kinds of *Myosotis*, and a *Gymnandra*, clearly indicate the prevailing character of its flowers. We observed, when first arriving on this island, where the vegetation is purely arctic, that we gathered in a few minutes more plants in bloom than we had observed during many weeks on that range of islands comprising Radack, &c. and situated between the tropics.

Farther northwards, on the rocky island in the interior of Kotzebue's Sound, grew the *Azalea procumbens*, as at Unalashka and the Cove and Isle of St. Lawrence; with the alpine *Willows*, *Cornus suecica*, *Linnæa borealis*, some arctic species of *Rubus*, &c. The *Empetrum nigrum* and *Ledum palustre* cover the moorland, with the *Sphagnum*, but the *Ledum* does not here form the tall shrub which decorates the turfy bogs of the north of Germany.

The vegetation at the interior of Kotzebue's Sound is much more luxuriant than within St. Lawrence's Cove. The *Willows* are taller, the *grasses* grow stronger, all the plants

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are more stout and succulent, while the greater number of species common to the American coast than appear in St. Lawrence's Cove, indicate a more temperate climate. On the island of that name, we gathered *Alnus incana*, as a very diminutive shrub, and *Spiræa chamædrifolia*, both of which we had remarked at Kamtschatka, and not on the American Island Unalashka; and which a sterner atmosphere seems to have driven from St. Lawrence's Cove. An *Orobanche* and a *Pinguicula* are among the plants of this island. The *Cineraria palustris* grows with remarkable luxuriance in the well watered slopes formed at the base of the mounds of ice; while *Betula nana* is seen even on the very shores. The plain country of this island is free from snow throughout the summer.

[TAB. LXIII. LXIV. LXV. LXVI. LXVII.]

ON THE PLANTS OF THE NATURAL ORDER
UMBELLIFERÆ,

*Detected by Dr. GILLIES in the extra tropical parts of
South America.*

THE species of this genus, found by Dr. Gillies in South America, and chiefly in the Cordilleras, both on their eastern and western sides, are not numerous, and their illustration has been greatly facilitated by the recent labours of Hoffman, Sprengel, and more especially of Koch and De Candolle. The country in question seems to be, more particularly, the district of the *Mulineæ*, a subtribe of De Candolle, of which the genera are less satisfactorily determined than those of the other groupes of the order; and to me it appears that *Fragosa*, Ruiz et Pav. and *Pectophytum* of Kunth, should be removed from the *Hydrocotyleæ*, where De Candolle has placed them, and arranged with the *Mulineæ*.